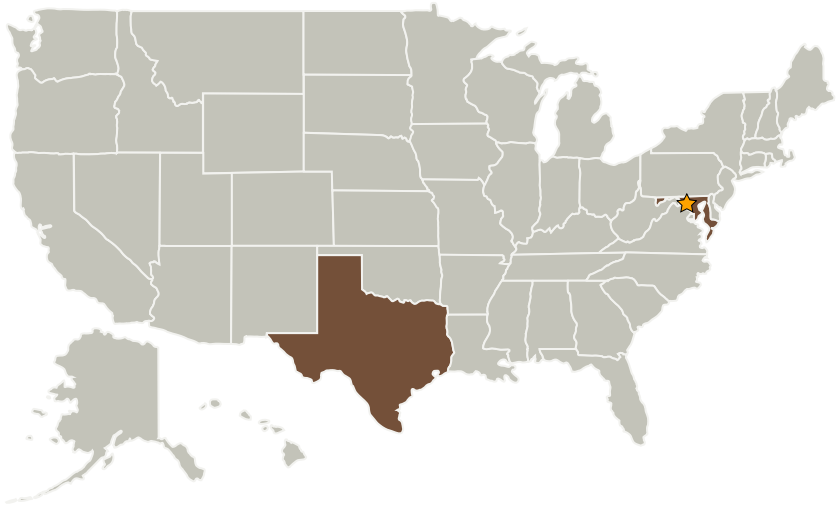
Self-Calibrating Vector Helium Magnetometer (SVHM), Phase II

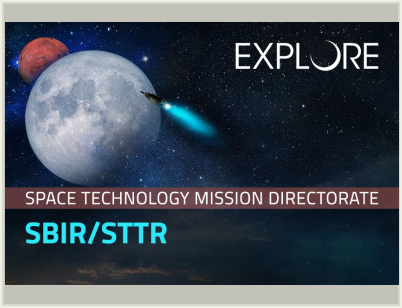
Completed Technology Project (2009 - 2011)

Project Introduction

This Phase 2 SBIR proposal describes the design, fabrication and calibration of a brass-board Self-Calibrating Vector Helium Magnetometer (SVHM). The SVHM instrument is capable of making high accuracy vector component measurements of Earth and planetary magnetic fields. The major SVHM innovation is use of scalar field measurements made with the SVHM sensor to self-calibrate the vector measurements thereby eliminating the standard suite of three fluxgate vector magnetometers and the independent scalar magnetometer required to correct for fluxgate drifts and offsets. The SVHM bread-board conceptual design can achieve a dynamic range of iÓ65,000 nT, both vector and scalar accuracy with self-calibration of iÓ1 nT, and sensitivity of <10 pT /%Hz. The SVHM bread-board will be miniaturized to meet volume, power and mass goals. The SVHM bread-board will utilize a fiber-coupled laser pump source and resonance drive, which permits reduction of helium cell volume by a factor of 10 and eliminates resonance drive coils and cables. The feasibility of designing a brass-board SVHM model using advanced laser and digital components was established in Phase 1. The SVHM bread-board will be calibrated and the self-calibration function demonstrated at a NASA coil facility during Phase 2.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Polatomic, Inc.	Supporting Organization	Industry	Richardson, Texas

Primary U.S. Work Locations	
Maryland	Texas

Project Transitions

February 2009: Project Start

February 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors